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SCIENCE.—SUPPLEMENT.

FRIDAY, JANUARY 21, 1887.

THE UNIVERSITY EXTENSION MOVEMENT AT CAMBRIDGE.

THE university extension movement was begun at Cambridge about fifteen years ago. It occurred to some energetic men, especially to Professors Stuart and Sidgwick, that the university should attempt to influence the education of the country not only by examinations, but by direct teaching. It was thought that young men were sent out every year by *alma mater* for whom there was no place in the teaching system of the university itself, but who might find a field of activity in the great towns of England. The system has grown up from very small beginnings. At first a private enterprise, it shortly became part of the university organization, and it is now a recognized department of university work. During the last six years the growth has been very marked. In 1880 there were thirteen centres, in 1885 there were thirty-six. In 1880 thirty-seven courses of lectures were delivered; in 1885, eighty courses. The attendance at lectures, which in 1880 was 4,300, rose in 1885 to 8,500. The movement has spread all over England. The miners of Northumberland form a numerous and intelligent audience. There is a centre at Torquay and a centre at Portsmouth, but, as might be expected in England, the northern centres far outnumber the southern. London is the seat of a separate management under the joint government of the two universities, which extends its ramifications into the suburbs. Hitherto the teaching has been scattered over the country without any definite order or arrangement. Each centre has chosen that subject which seemed to suit it best. There have been examinations with classes and marks of distinction, and a certificate has been given by the vice-chancellor of the university, but there has been no systematic and continuous arrangement of teaching analogous to that which exists in the university itself. This want will now be supplied. The university has determined that attendance at certain courses of lectures, tested by examinations and marked by a certificate, shall take the place of a certain amount of residence at the university. When this scheme is put into working order, we shall have a system of academic teaching extending over the whole country,

and directly connected with university degrees. No more efficient means can be found of connecting the old English universities, which have too often been considered as hot-beds of clericalism and toryism, with the growing life of the nation, especially in the most democratic districts.

Let us now see how the system practically works. A town wishes to establish a course of extension lectures. The first business is to elect a committee, and to raise the necessary funds. The session extends from September to April, and occupies two courses of three months each, either of which may be taken separately. The lecturer is paid forty-five pounds for twelve weeks, the last week in each term being devoted to examinations. When it is found that funds can be provided either by subscriptions or by the sale of tickets, communications are opened with Cambridge. If the town is situated in the neighborhood of other towns which have previously established courses, matters can be arranged on a more economical basis. The university informs the town what lecturers it has at its disposal, and what courses they are able to give: the town determines what kind of lectures it desires to receive. The subjects vary very much. The northern miners are keen for instruction in science: suburban ladies prefer the literature and art of mediæval Italy or Germany. The lecturer belongs to one of two classes: he is either a man who has taken up this occupation as a profession, whose reputation is well known, and who occupies a position not inferior to that of a recognized university teacher, or he may be a young man who has just taken his degree, a senior wrangler, a senior classic, or a senior historian, who looks upon the occupation of university extension lecturing as one of the best openings available for an ambitious and successful career.

The first duty of a lecturer is to prepare his syllabus. It was laid down at the commencement of the scheme that every lecturer must, before he begins his work, write an elaborate syllabus, partly as a guaranty that his lectures are really good and thorough, but chiefly as an aid to his class in threading a difficult and unfamiliar subject. Two of these syllabuses lie before me, both by lecturers beginning their work. The first course, by a senior wrangler, is on work and energy: it consists of twelve lectures. The first, being introductory, is on the study of natural science, on its results, its methods, and the various

manners of discovering scientific truths. The second lecture is on the laws of motion, including a popular exposition of Newton's three laws. The third lecture is devoted to the examination of work, energy, and gravitation. In the fourth lecture certain simple machines are described, — the pendulum, the different kinds of lever, and the water-wheel. The next lecture deals with the nature of heat, and the sixth with the more elaborate theories of Mayer and Joule. The seventh lecture deals with light and sound, the eighth with chemical energy, the ninth and tenth with electricity and magnetism. The eleventh lecture is devoted to the conservation of energy and the manner in which it is transformed from one shape into another. The last lecture treats of the dispersion of energy, and concludes with an account of the sun.

It may be thought that this course is somewhat too extensive and ambitious, and its practical success remains to be proved by the examination; but no one can deny that it forms a brilliant attempt to deal in a single view with the main truths of physics.

The second course is of an entirely different character: it treats of the origin and early history of the English colonies in North America. Like the former, it consists of twelve lectures. The first lecture is devoted to ancient and modern systems of colonization, the Greek, the Roman, and the systems of modern states. The second lecture treats of the early voyages and settlements in America from Christopher Columbus down to the foundation of Quebec. Then follows the colonization and early history of Virginia, the colonization of New England, of Maryland, of the two Carolinas and Georgia; next come the Quaker colonies of New Jersey, Pennsylvania, and Delaware. In the eighth lecture we have reached the subject of the early colonial wars of France and England, from King William's war in 1689-97 down to the conspiracy of Pontiac in 1763. The condition of America in 1763 is then dealt with, with a sketch of each colony from the beginning of the eighteenth century up to that time. The tenth lecture treats of the war of independence; the eleventh, of the American constitution; and the twelfth and last, of the history of modern Canada down to the present day.

These syllabuses are printed in little pamphlets, and the chief criticism to be made upon them is that they are often somewhat too long and elaborate. Where so much is printed for a course, there is less room for detailed exposition. This, however, is a fault on the right side, which experience will prevent.

The lectures are given once a week, and last

an hour. The hour which precedes or follows the lecture is taken up with what is known as 'the class.' In this the formal method of the lecture is abandoned, discussion of difficult points is invited, questions are put to the lecturer on any thing that appears obscure, or the lecturer gives additional details and illustrations. The class is open to all who attend the lectures, but in a series of years this is generally found not to exceed one-half. At the end of each lecture in the syllabus will be found three or four questions which are to be answered by the students at home; and help is freely given in the little pamphlet, as to the line to be taken in answering the questions, and the books to be used. These exercises are purely voluntary: the answers are sent to the lecturer, who returns them with corrections before the following lecture. The number of those doing papers is not more than one-third of those who attend the class, or one-sixth of those who attend the lectures. Finally, at the end of each term, an examination is held, conducted, not by the lecturer, but by independent examiners appointed by the university. The numbers examined form about one-fourth of the class, or one-eighth of the whole attendance at lectures. In connection with each course of three months, certificates are granted on the double basis of the lecturer's report of the weekly exercises and the examiner's report of the final examination. In this way is tested not only the capacity of getting up a subject and passing an examination, but the continuous effort of steady work throughout the term. It is very interesting to consider what classes of people are reached by the university extension lectures. Although the movement was first devised for adults, yet the lectures have been generally frequented by schools, and especially by girls' schools. They are useful in cases where a competent visiting lecturer cannot be obtained. Much more accessible to these influences are young people who have left school, and have not yet settled in life. This is the golden age for education, corresponding to the time spent at college by those who can afford it. From these classes, if from any, must be drawn the affiliated students whom the extension movement will link with the university. If the lectures are delivered at night, they are usually attended by clerks and shop people, who are at work in the day.

However, the most interesting field of work which the movement has yet found has been the artisans, and among these are pre-eminent the miners of Northumberland. Mr. Roberts, the organizing secretary, writes, after a fortnight's visitation to Northumberland, "I wish I could adequately describe the impression this fortnight's

work made upon me. The sturdy intelligence of the pitmen, their determined earnestness, the appreciative and responsive way in which they listened, the downright straightforwardness of their speech, — all these it is impossible fully to express. I am persuaded that in the Northumberland and Durham districts the pitmen are ripe for a scheme that will bring higher education and culture within their reach." The northern population is eager for knowledge, and travels long distances to seek it, in all kinds of weather, over the roughest of roads. Some persons here walked regularly six miles to hear the lectures. At Newcastle some travelled as much as ten miles to hear the lectures. Two pitmen, brothers, attended a course regularly from a distance of five miles: they went there by train, but were compelled to walk home. This they did for three months on dark nights, over wretchedly bad roads, and in all kinds of weather. One miner writes in gratitude, "I deeply deplore the last thirty-four years of my life. Being buried in the mines since I was nine years of age, and taught to look jealously on science as being antagonistic to religion, I little thought what pleasures of thought and contemplation I lost; I have, however, broken loose from my fetters, and am proceeding onwards." It is sad to think that this energy and hunger for learning should be cramped by inability to pay for it. Working-men can seldom afford more than one shilling or one shilling sixpence for a course, yet at two shillings a ticket it would take an attendance of seven hundred to make the lectures pay. Besides, the cost of the ticket is not the only tax on the artisan. Text-books must be bought, weekly papers posted to the lecturer, while wages are lost by attendance at the evening classes. The whole system requires a solid pecuniary basis to make it permanent; and that, up to the present moment, has not been forthcoming.

Although much has been done, we may hope for much larger developments in the future. A staff of thoroughly trained lecturers should grow up, who will make this occupation the work of their lives. The courses of instruction will be more systematic, and will be spread regularly over a number of years. In some cases the lectures will crystallize, as they have already done, into local colleges or small universities; in others they will remain in a more fluid state. Whatever may be the result of the movement, there is no doubt that the problem has been solved of bringing the highest university education within the reach of the lowest classes who are capable of receiving it. Such a movement may be less necessary in countries where education is more democratic, and where no class has been left out; but in England,

where the higher education, like every thing else, is organized mainly for the privileged classes, such an enterprise is an incalculable boon.

Some few years ago, on a summer afternoon, a body of artisans were watching our Cambridge undergraduates amusing themselves on the river which flows by the backs of the colleges. Their conversation was overheard by a passer-by, and it was discovered that they were under the impression that all Cambridge undergraduates were sons of noblemen, and that no one could live at the university under a thousand pounds a year. This was the exaggeration of ignorance, but let us hope that the extension movement will in another generation render all such misunderstandings impossible.

OSCAR BROWNING.

THE TRAINING OF THE FACULTIES OF JUDGMENT AND REASONING.¹

I AM going to endeavor to show, as far as I have the power to do so, how the psychological and logical principles which relate to judgment and reasoning may be applied to the treatment of our ordinary school subjects, — what our methods of teaching should be, if we desire those methods to be framed in accordance with the laws and suggestions of mental science. I must refer you to Mr. Sully's indispensable 'Teacher's handbook of psychology,' for the discussion and full exposition of the psychological principles. But also, I shall begin by running over the chief points which require our attention, before I attempt to sketch my lessons, so that you may have the principles on which I work freshly in your minds. My desire, as you know, is not to upset or change this or that method of teaching this or that subject, but to bring the precepts and laws of psychology to bear directly on the actual practice of the classroom. In what I have got to say on the logical side of the matter, I am largely indebted to Mr. Jevons, to whose excellent and suggestive little book, 'Elementary lessons in logic,' I must refer you. And let me say here that I think every teacher ought to own the book, and to make a point of mastering especially the last ten lessons.

To judge is to connect two notions, two representations or mental images of what has been perceived; and the outward expression of this act is a statement in words, or a proposition. Thus, if we have acquired the general notions or concepts, say, of hardness and heaviness, we may connect either or both with any particular thing or class of things, or with any other notion. We may say, 'This ground is hard,' or, 'This table is

¹ From the *Journal of education*, a paper read before the Education society, Oct. 25, 1886.